CDM
An Integral Component of Air Traffic Management

Integrated CNS Conference and Workshop
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Detect the Difference

Agenda

- Setting the Scene
- What is CDM
- The Role of Technology
- Case Study
- Advancing the Case Study
- The Business Case

Setting the Scene

- **Statistical Evidence Indicates that Passenger Traffic and Demand Are on the Rise, Returning to pre-September 11 levels**
  - **US Airlines Are Reporting Increases in Delays (January 2004); According to DOT:**
  - **On-time Arrival Rate was 74.9%, down from 76% in December**
  - **Airlines canceled 3% of flights compared with 2.1% in December**
  - **ATC System delays affected 9.24% of flights compared with 9.13% in December**
  - **Risk that Summer 2004 will resemble Summer 2000**
  - **Load Factors**

Setting the Scene

- **Network Carriers/Legacy Airlines Continuing to Lose Billions of Dollars Annually**
  - **Revenue Per Available Seat Mile (RASM) continues to fall faster that Cost Per Seat Mile (CASM); Revenues mirror levels from the early 1990s, while capital costs have doubled for many airlines**
  - **Rising fuel prices**
  - **Security requirements**
  - **Increased passenger demands**
  - **Strained labor/management relations**
  - **Executive leadership changes**

Setting the Scene

- **Fierce Competition Between Network and Low-Cost Carriers (LCCs)**
  - **Significant Passenger Share at Large Hub Airports**
    - **Chicago Midway** **86%**
    - **Baltimore** **52.2%**
    - **New York Kennedy** **45.9%**
    - **Las Vegas** **42.2%**
    - **San Jose** **42%**
    - **San Diego** **39.6%**
    - **Ft. Lauderdale** **39.5%**
    - **Phoenix** **37.9%**
    - **Tampa** **34.5%**
    - **Orlando** **34.1%**
  - **JetBlue's Performance Underscores Differences in KPIs Between LCCs and Legacy Carriers**
    - **March 2004: RPMs 38.6% higher than March 2003; 36% increase in capacity**
    - **YTD 2004: 42% increase in RPMs; 44.6% increase in capacity; 79.9% load factor**
    - **Fleet Growth: 57 A320s, with 12 to be delivered this year; 100 Embraer 190s on order**

Setting the Scene

- **Increased Competition Among Airports**
  - **Passenger Traffic is Soaring at Mid-tier Airports Where LCCs Are a Formidable Presence**

- **Airports Are Evolving Into a Key Bottleneck in the ATM Network**
  - **All Flights Start and End at an Airport**
  - **Relatively Minimal Industry Investment in Traffic Flow Improvements on the Surface, Relative to Investments In Enroute Initiatives (CDM)**

Setting the Scene

- **Aviation Industry Players Compete and Cooperate In Manner Which is Unusual in Commercial World**
  - **Fierce Competition in the Marketplace**
    - **Marketing; Fill the Seats**
    - **Frequent Flyer Rewards**
  - **Extraordinary Cooperation and Camaraderie at an Operational Level**
    - **On the Field and In the Air**
    - **Alliances**
    - **Legislative Issues**

Current Situation Demands Improvements…

What Is CDM?

- Information Exchange
- Buzzword
- Compromise
- Culture
- Philosophy
- Policy
- Program
- Process
- A Beginning
- An End
- A Means to an End

Definition of CDM

- **According to Webster, a Philosophy is a *System of Principles for Guidance in Practical Affairs***
- **CDM is a Philosophy that Should Be Applied with an Acceptance and Understanding That No Two Airports or Airport Stakeholder Teams Function in Exactly the Same Manner**
  - **Interoperability is key**
  - **Broad, transparent communication is essential**
  - **Continuous measurement and management of the system is pivotal to stakeholder adoption of philosophy**
  - **Tangible, positive impact for All participants**

Once you've seen one airport, you've seen one airport

Goals of CDM

- **Provide the Right Information to the Right People, At the Right Time**
  - **High quality**
  - **Rapid update**
- **Facilitate Common Situational Awareness That Enables Users to Optimize a Situation in Accordance With a Defined Plan (gate occupancy, arrival sequence, departure sequence, pushback sequence, de-icing activities)**
  - **Understand the situation**
    - **Real-time**
    - **Historical**
  - **Leverage available resources**
- **Provide the Capability to Measure Performance**
- **Maximize Use of Available Capacity Within Identified Constraints**

Effective Application of CDM Philosophy

- **Global Airline Alliances**
  - More than marketing agreements
- **European Airport Initiatives**
  - Athens
  - Barcelona
  - Brussels
  - Lisbon
  - London Heathrow
  - Milan
  - Stockholm
- **Passenger Bill of Rights**
  - Compensation policies
  - US Enroute airspace initiatives
- **Security**

Facilitating CDM -- A Way Forward

- **Gains Are Possible Via Non-Automated Means; Risk that Adoption Will Be Slow and Limited in Scope; Reduced Chance of Success**
  - **Timeliness**
  - **Error-prone**
  - **Elapsed time before benefits are achieved**
  - **Cost**

- **Application and Integration of Proven Technology is Key to Success**
  - **Rapid data update rate**
  - **Data consistency**
  - **Intuitive**
  - **Robust**

The Role of Technology

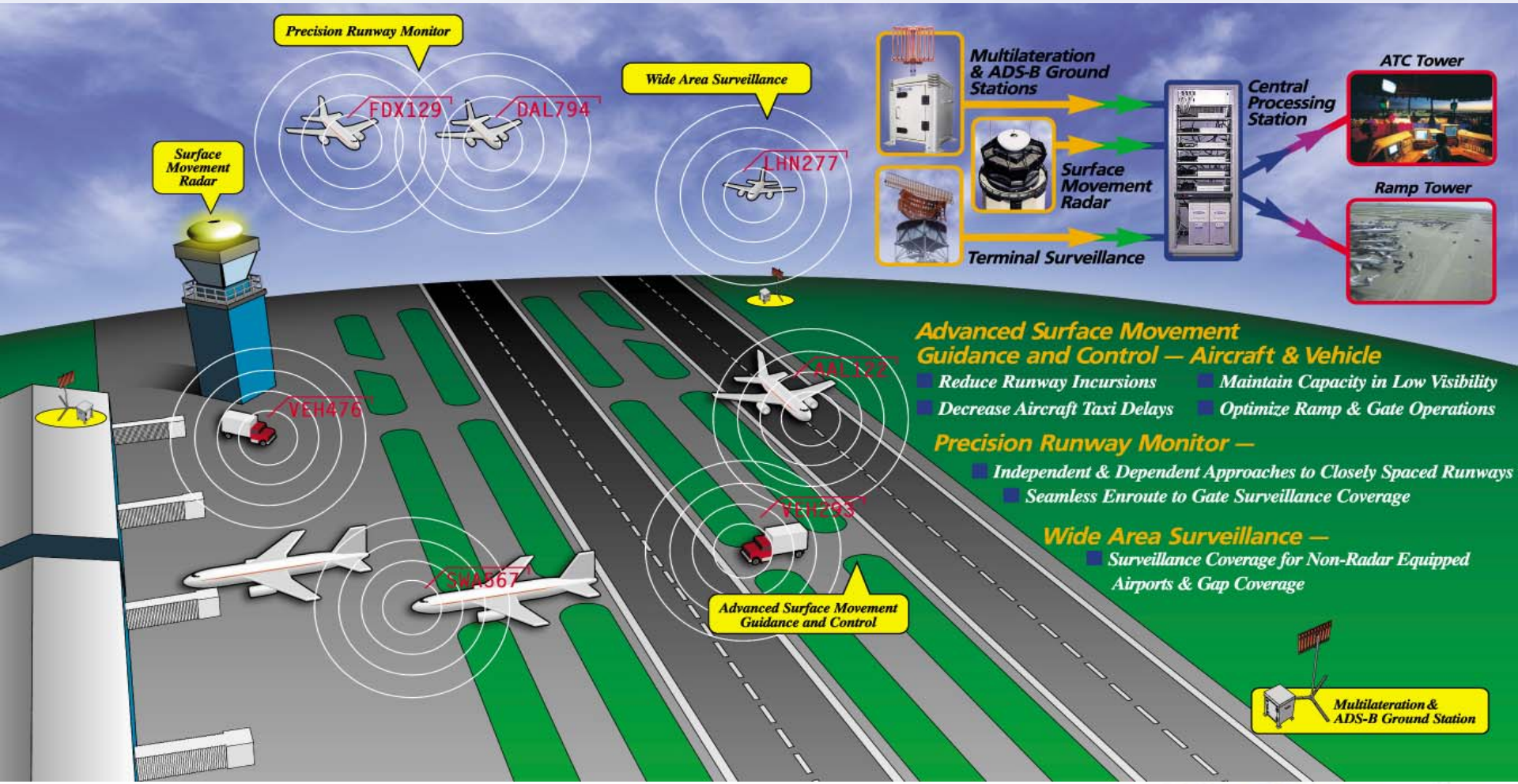
Surveillance Technologies

- **Near Global Acceptance of the Value of High Quality, High Update Rate Surface Surveillance Data**
  - **Aircraft and vehicle identification and position**
- **Airports and Air Navigation Service Providers Worldwide Have Endorsed the Proven Safety Benefits of Surveillance Technology**
  - **European A-SMGCS**
  - **US ASDE-X**
- **In Addition to the Safety Benefits, Opportunities to Dramatically Improve Airside Efficiency and Capacity**
  - **Fresh "set of eyes"**

Surveillance Technologies
Core Building Block for CDM

- **Source of High Quality Aircraft and Vehicle Position Data for Decision Support Tools**
- **Tools Derive Objective, Comprehensive Information About Airside Operations**
  - **Information processing and operations modeling**
  - **Opportunity to reduce taxi time, improve punctuality, match capacity to demand, optimize the use of available resources and infrastructure, reduce the impact of irregular operations, and improve predictability of operations**
- **Technologies *exist today* to achieve *networked CDM* and *quantifiable operational benefits***

Surveillance Technologies
Core Building Block for CDM



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Case Study

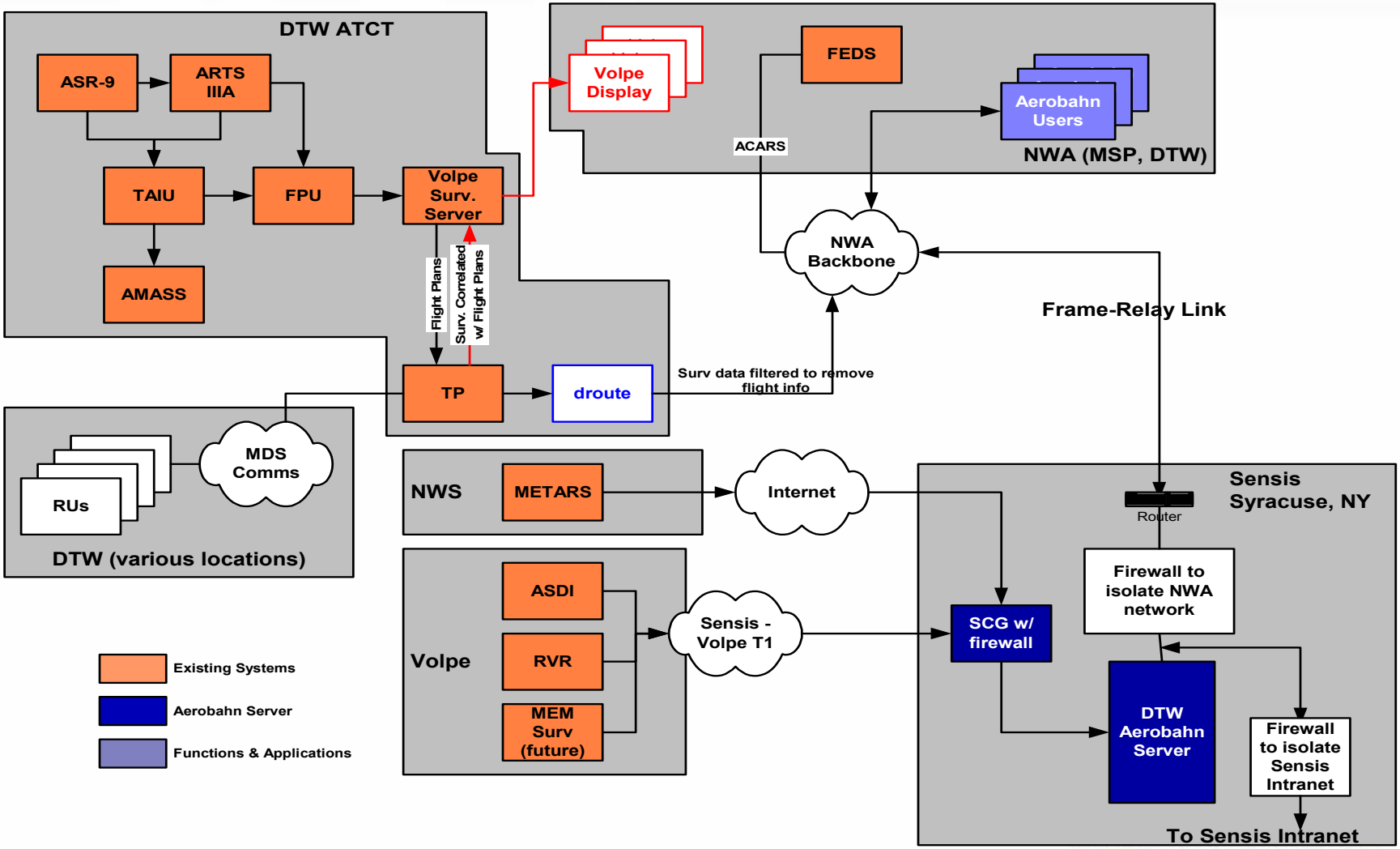
Background

- **Team**
  - Comprised of Industry/Government Partners
  - FAA, NASA, Northwest Airlines (NWA), Sensis, Volpe TSC
- **Goal**
  - Evaluate the Impact of Surveillance Data on the Management of Airside Operations at a Busy Airport
- **Original Scope**
  - Detroit Metropolitan Wayne County Airport (DTW)
  - Users in NWA Ramp Tower and Local Control Center
  - Prototype Decision Support Tool
  - Beta Version of Surveillance Technology
  - 12 month Evaluation

Background

- **Solution Description**
  - **Web-based Decision Support Tools Available to Users for Tactical Management of Surface Traffic and Post Analysis of Operational Events**
  - **Surveillance Technology Consisted of 9 Remote Units (RUs) and a Single Reference Transponder**
    - **3 Receive/Transmit**
    - **6 Receive Only**

Solution Configuration

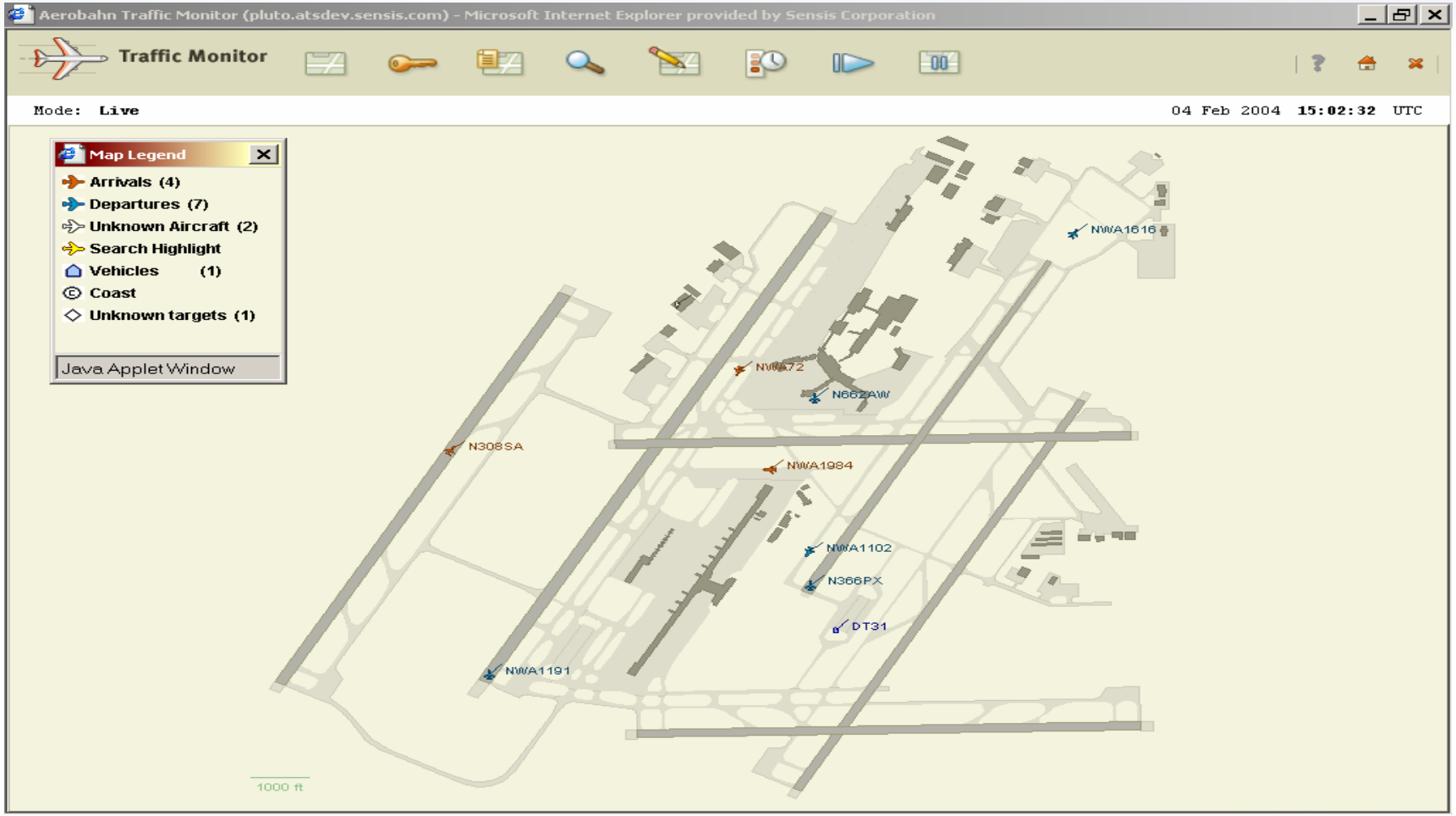


Key Features of Architecture

- **Software**
  - **Proven, High Performance Database**
    - **Dynamic Development of Reports and Queries**
    - **Shared File System Reduces Risk of Data Loss**
  - **Secure**
    - **Data Encryption For Inter-organizational Data Sharing**
    - **Multiple Levels of "User"**
  - **Flexible, Browser-Based User Interface**

- **Hardware**
  - **Scaleable & Configurable**
  - **PC-based**
  - **Dell Servers**
  - **Easily Upgradeable**
  - **Interface to Third Party Systems**

Tactical Management of Surface Traffic



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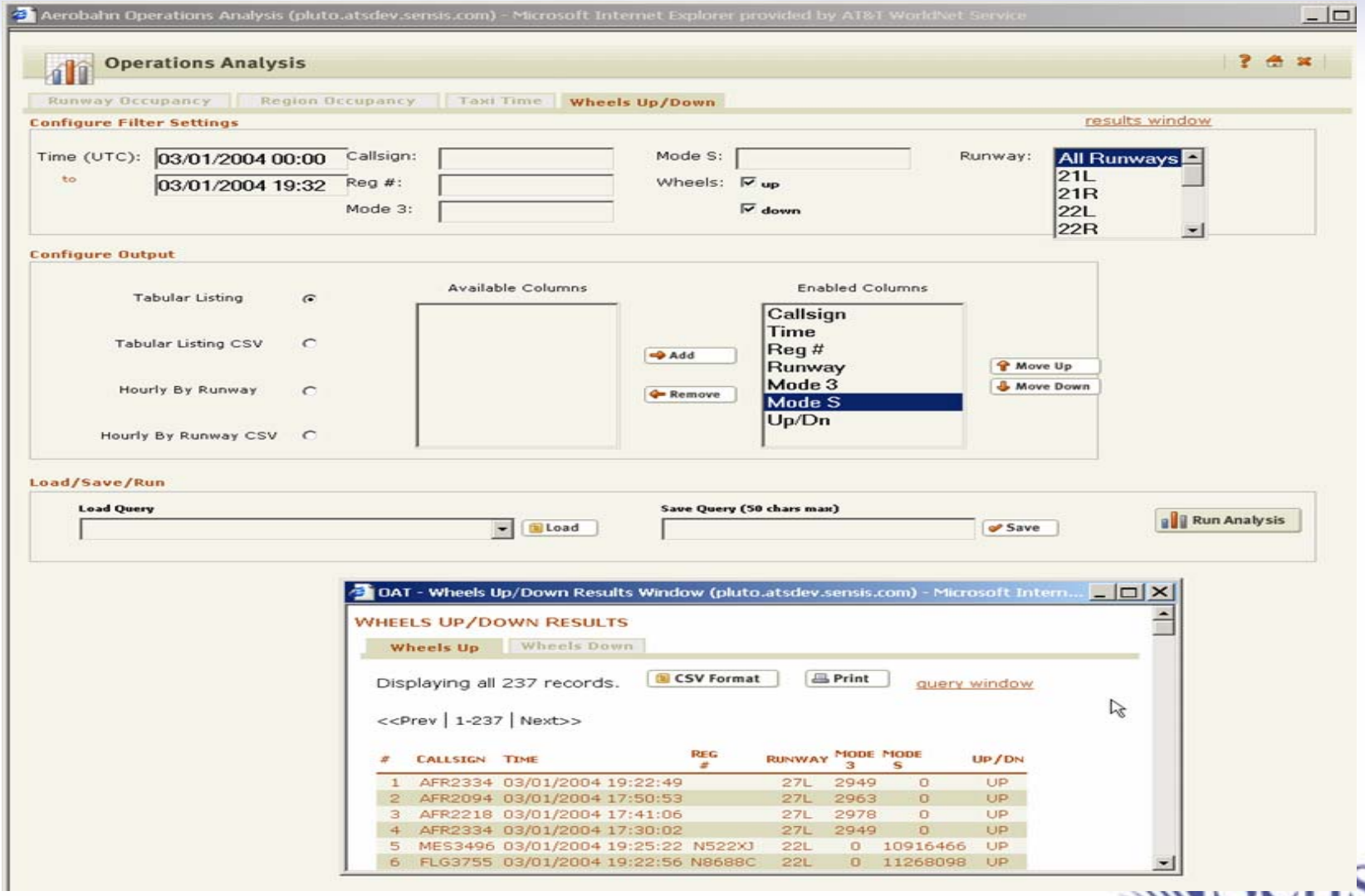
Post Event Analysis



Users' Response to Solution

- **Integral Part of Measurement and Management of NWA's DTW Airside Operation**
- **Increase In Number of Users**
- **Broader Application of Solution to Resolve Real World Challenges**
  - **System Operations Center (SOC)**
  - **Performance Monitoring and Measurement**
- **Prototype Decommissioned, Commercial Products Installed**

"Value of the solution is enormous..."

"The system is essential to our operation..."

Results

- **Metrics Working Group Estimates**
  - **More Efficient Movement In Ramp Area**
    - **Estimate 2464 Hours of Taxi Savings Per Year (~ $4.5M/yr)**
  - **More Efficient Handling of Irregular Operations**
    - **SOC Decisions Based on Monitoring of DTW Surface Traffic Avoided 20-24 Cancellations During One Winter Storm**
  - **Fewer Voice Calls Between Ramp, SOC, Pilots & ATC**
    - **27% Reduction In Ramp – Pilot Communication Time**
    - **75% Reduction In SOC – Ramp Calls To Locate "Missing" A/C**

Demonstrated Results

- **Reduced taxi in & taxi out times**
  - **Awareness of precise location of inbounds influences pushback clearance**
  - **Tactical management of pushback and traffic flow into and out of ramp reduces delays**
  - **Unimpeded taxi in/out of ramp area**
- **Reduced Routine communications, and time spent assembling information required to make a decision**
  - **Shared situational awareness enables stakeholders to make decisions sans a phone call**
  - **Crew scheduling**
  - **Ground operations**
  - **Passenger Customer Service**
  - **Emergency teams' response time**

Demonstrated Results

- **Improved ability to measure and manage the operation via objective, quantifiable data**
  - **Highly accurate taxi in and taxi out times**
  - **Time from ATC handoff to takeoff**
  - **Time elapsed waiting to cross active runway**
  - **Measure time flight under ATC control versus airline or airport**
  - **Measure occupancy times (runways, taxiways, gates, deicing pads, spots)**

- **Storage of Real-time Surface Situation Data Enables After-Action Reviews and Data Mining To Identify Systemic Problems, Make Operational Changes and Measure the Impact of the Changes**
- **Create training programs (what to do and what not to do) using actual scenarios**

Advancing the Case Study to the Next Level

Networked CDM…The Next Step

- **The Right Technical Components Are Available today to Create Robust, Flexible Solutions that Complement a Variety of Airport Operations and Associated Stakeholders**
- **To Achieve Optimum Levels of Safe, Efficient ATM, ALL Industry Stakeholders Must Demonstrate a Commitment to Connect the Nodes Throughout the Network *for the Benefit of the Overall Network***
  - **Airlines**
    - **Standalone**
    - **Global Alliances**
  - **Air Navigation Service Providers (ANSPs)**
    - **FAA ATC SCC**
    - **FAA Enroute Centers**
  - **European Central Flow Management Unit (CFMU)**

Networked CDM…The Next Step

- **Global Industry, Capitalize on Advantages of a Harmonized Approach to Management of Airport Airside Operations**
- **Leverage Technologies to Expedite Adoption and Implementation of Common Policies and Procedures**
  - **EUROCONTROL CDM Levels**
    - **Level 1: Basic Airport CDM; Airport Turn-round Process-Milestones Approach**
    - **Level 2: Variable Taxi time Calculation**
    - **Level 3: Collaborative Pre-departure Sequence**

Networked CDM…The Next Step

- **Operational Benefits to All Stakeholders**
  - **Share Costs as well as Benefits**
  - **Provide Visibility Among Business Partners**
  - **Distribute Relevant Information to those Impacted by Decisions**
    - **Airport Operators**
    - **Passengers**

Networked CDM…Extension of Case Study

- **Expand Users at DTW**
  - **Wayne County**
  - **Ground Handlers**
- **Expand capabilities at AMS**
  - **Situational awareness of DTW operations**
  - **Situational awareness of CDG operations**
- **Expand Capabilities in MSP**
  - **Situational awareness of AMS operations**
  - **Situational awareness of all domestic hub airport locations**
- **Install Capabilities at FAA ATC SCC**
- **Forward Turnaround Activity Information to European CFMU**

Networked CDM…Extension of Case Study

- **Install Capabilities at FAA Enroute Centers**
  - **Increased situational awareness enables Centers to see the actual operation as events transpire, with no need for phone calls**
    - **Adjust departure restrictions such as miles-in-trail by adjusting restrictions based upon real demand versus anticipated demand**
    - **Runway, taxiway, and spot queue information**
  - **Metrics collection**
    - **Taxi out time (pushback to wheels up)**
      - **Departure taxi times exceeding 40 minutes**
    - **Time aircraft moves off the spot**
    - **Aircraft approaching/in ATC delays**
      - **Average minutes of delay per delayed flight**
    - **Region occupancy times**
    - **Trend analysis**
  - **Participate in flow management discussions with airline SOCs and FAA ATC SCC**

The Business Case